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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

PICKARD, ALISON K

ART UNIT PAPER NUMBER

3676

DATE MAILED: 10/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/903,313

Applicant(s)

ZHENG, XIAOQING

Examiner

Alison K. Pickard

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-78 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-76 and 78 is/are rejected.
- 7) ☒ Claim(s) 77 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5, 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The attempt to incorporate subject matter into this application by reference to the “Adaptive Divert...” article and to the “Dynamic Analysis...” article is improper because neither is a U.S. Patent or patent application (published or pending). See MPEP 608.01p.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-55, 57-64, 66, 72, and 77 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 2, 15-17, 19, and 20, “the sealing face” lacks antecedent basis.

Claims 26, 27, and 29, “said member” and “the said member” lack antecedent basis.

Claim 30, lines 6 and 7 and claim 46, “the sealing face” lacks antecedent basis.

Claim 55, “said member” and “that member” lack antecedent basis.

Claim 57, lines 5 and 6, “the sealing face” lacks antecedent basis.

Claim 58, “the face” lacks antecedent basis.

Claim 66, “the rotor ring sealing face” lacks antecedent basis.

Claim 72, “the pumping grooves” lack antecedent basis.

Claim 77, “the stator member” lacks antecedent basis.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims 1-4, 8-17, 19, 20, 22, 23, 30, 34-43, 45, 46, 48, and 49 are rejected under 35 U.S.C. 102(b) as being anticipated by German Patent No. 3,819,566 (DE '566).

DE '566 discloses a rotary seal assembly comprising a first member having a seal face and a second member having a sealing face. The first member can be one of a rotor 2 or stator 3. The second member can be the other of a rotor or stator. The first or second member has plural pumping grooves wherein a first set 19 starts proximate a center portion of the sealing face and extends outward while a second set 18 starts proximate the center and extends inward. The first set terminates inward of an outer portion of the sealing face. The second set terminates inward an inner portion of the sealing face. The first and second sets start adjacent each other at the center portion and curve outward and inward, respectively. Each groove has an inside edge and

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an outside-edge curving inwardly. The pumping grooves direct fluid fed to the center simultaneously both inward and outward to provide a uniform fluid film thickness between the sealing faces during coning. A feeding groove 20 having a plurality of orifices 21 therein supplies the fluid to the center portion. The orifices are angled

-6. Claims 1-4, 8, 9, 11-20, 22, 23, 30, 34, 35, 37-46, 48 and 49 are rejected under 35 U.S.C. 102(e) as being anticipated by Lebeck (6,213,473).

Lebeck discloses a rotary seal assembly comprising a first member having a sealing face and a second member having a sealing face. The first member can be one of a rotor 40 or stator 42. The second member can be the other of a rotor or stator. The first or second member has plural pumping grooves wherein a first set 96/100 starts proximate a center portion of the sealing face and extends outward while a second set 94/98 starts proximate the center and extends inward. The first set terminates inward of an outer portion 144 of the sealing face. The second set terminates inward an inner portion 154 of the sealing face. The first and second sets start adjacent one another (Fig. 5) or offset from one another (Fig. 6). The first and second sets start adjacent each other at the center portion and curve outward and inward, respectively. Each groove has an inside edge and an outside edge curving inwardly. The pumping grooves direct fluid fed to the center simultaneously both inward and outward to provide a uniform fluid film thickness between the sealing faces during coning. A feeding groove 68 having a plurality of orifices 84 therein supplies the fluid to the center portion.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 5-7 and 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over DE '566.

DE '566 does not disclose that the feeding groove is discontinuous forming a number of feeding groove sections. This is considered a design choice. Applicant has not stated that changing the shape of the feeding groove such that it has a number of sections solves any stated problem or is for any stated purpose. And, it appears the feeding groove of DE '566 would perform equally as well. See *In re Dailey*, 149 USPQ 47 (CCPA 1966). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the shape of the feeding groove such that it discontinuous and has a number of sections as a matter of choice in design.

9. Claims 21, 24, 25, 47, 50, and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lebeck.

Regarding claims 21 and 47, Lebeck does not disclose the pumping grooves have a width exceeding their depth. This is considered a design choice. Applicant has not stated that forming the grooves so that their width exceeds their depth solves any stated problem or is for any stated purpose. And, it appears the pumping grooves of Lebeck would perform equally as well.

Regarding claims 24, 25, 50, and 51, Lebeck does not disclose that feeding groove has a rounded or square bottom. This is considered a design choice. Applicant has not stated that forming the feeding groove with a rounded or square bottom solves any stated problem or is for any stated purpose. And, it appears the feeding groove of Lebeck would perform equally as well.

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Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the pumping grooves so that their width exceeds their depth and the feeding groove with a rounded or square bottom as a matter of choice in design.

10. Claims 26, 28, 52 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lebeck in view of Lindeboom (3,751,045).

Lebeck discloses a rotary face seal assembly wherein one member 42 has a holder 58 and spring 56. However, the spring does not bias the first and second members apart. Lindeboom teaches a rotary face seal assembly wherein one member 30 has a holder 48 and a spring 52 that biases the first and second members apart. This arrangement provides a normally open, rather than closed, seal assembly. Keeping the assembly open would reduce wear during start up. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made modify the holder, member, and spring of Lebeck such that the spring biases the first and second members apart as taught by Lindeboom to reduce wear on the members during start-up.

11. Claims 1, 29, 30 and 55-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson (5,609,342) in view of Lebeck.

Peterson discloses a rotary face seal assembly comprising a stator 3 having a sealing face and a rotor 2 having a sealing face. The stator is mounted on a holder 8 that allows the stator to cone negatively or positively with respect to the rotor. The stator or rotor can have pumping grooves 21 in the sealing face. Peterson does not disclose that the grooves are partitioned into first and second sections or that the rotor or stator has a feeding groove and orifice. Lebeck teaches a rotary face seal assembly wherein the sealing faces of the rotor or stator comprise

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plural pumping grooves having a first section and second section and a feeding groove having plural feeding orifices. The second section of pumping grooves 96/100 starts proximate a center portion of the sealing face and extends outward while the first section 94/98 starts proximate the center and extends inward. The first set terminates inward of an outer portion 144 of the sealing face. The second set terminates inward an inner portion 154 of the sealing face. The first and second sets start adjacent one another (Fig. 5) or offset from one another (Fig. 6). The first and second sets start adjacent each other at the center portion and curve outward and inward, respectively. Each groove has an inside edge and an outside edge curving inwardly. The pumping grooves direct fluid fed to the center simultaneously both inward and outward to provide a uniform fluid film thickness between the sealing faces during coning. The feeding groove 68 having a plurality of orifices 84 therein supplies the fluid to the center portion. Lebeck teaches that this configuration creates two different gas seals and causes the gas pressure to distribute itself across the seal faces so that a desired stiffness is achieved. This also allows ensures a seal across the faces whenever there is deflection in one of the faces. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the sealing faces of Peterson with the groove configurations as taught by Lebeck to ensure an effective seal and the proper film stiffness during sealing face deflection.

Regarding claims 59, 61, 64 and 73, neither Peterson nor Lebeck disclose that the feeding groove is discontinuous with plural sections, that the orifices are angled, or that the pumping grooves have a width exceeding their depth. All are considered design choices. Applicant has not stated that making the groove discontinuous, the orifices angled, or the pumping grooves with a width exceeding their depth solve any stated problems or are for any particular purposes.

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See *In re Dailey*, 149 USPQ 47 (CCPA 1966). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to make the groove discontinuous, the orifices angled, and the pumping grooves with a width exceeding their depth as a matter of choice in design.

12. Claims 76 and 78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson in view of Lebeck as applied to claim 56 above, and further in view of Lindeboom.

Peterson discloses a spring. However the spring does not bias the stator and rotor apart. Lindeboom teaches a rotary face seal assembly wherein one member 30 has a holder 48 and a spring 52 that biases the first and second members apart. This arrangement provides a normally open, rather than closed, seal assembly. Keeping the assembly open would reduce wear during start up. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made modify the holder, member, and spring of Peterson such that the spring biases the first and second members apart as taught by Lindeboom to reduce wear on the members during start-up.

Allowable Subject Matter

13. Claims 27, 53, and 77 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

14. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record, taken as a whole, does not show nor suggest a rotary face seal assembly comprising a stator and rotor each having a sealing face wherein at least one of the sealing faces has a first and second set of pumping grooves each beginning proximate a center portion and simultaneously directing fluid fed to the center portion both outward and inward to provide a uniform fluid film when one of the sealing faces cones, wherein one member is mounted on a holder and movable therewith while a spring biases the stator and rotor (members) apart, and wherein a gap between the holder and the member is responsive to system pressure which overcomes the spring at a predetermined level. The closest prior art, for example Lindeboom, does not include a gap between the holder and member (i.e. stator) so that pressure at a predetermined level in the gap would urge the members together. There is no motivation, absent Applicant's own disclosure, to modify the references in the manner required by the claims.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited prior art shows various seal assemblies with grooves (pumping and feeding).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alison K. Pickard whose telephone number is 703-305-0882. The examiner can normally be reached on M-F (9-6:30), with alternate Friday's off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on 703-308-3179. The fax phone numbers for the

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organization where this application or proceeding is assigned are 703-872-9326 for regular communications and 703-8729327 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-1113.



Alison K. Pickard
Examiner
Art Unit 3676

AP
September 29, 2002